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INVESTIGATING THE ENVIRONMENTAL CHALLENGES OF EXPLODING CITIES - FOCUS ON SELECTED INFORMAL SETTLEMENTS OF ABUJA, NIGERIA

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Abstract
The increasing levels of urbanisation globally has created a situation in which cities are growing rapidly. The growth has had lasting impacts on the infrastructure and environment of the city, often leading to pollution and other environmental impairment. This study examines the environmental challenges in informal settlements of Abuja, Nigeria. Data collected were on the environmental challenges in five purposively selected informal settlements in Abuja, Nigeria. Utilizing a qualitative and quantitative research approach, the paper investigates the environmental challenges of rapid urbanisation in the city. The major research instruments used were questionnaire for quantitative data and observation schedule for qualitative analysis of the study area. Quantitative data were subjected to statistical analysis using Statistical Package for the Social Sciences (SPSS). Qualitative data were subjected to content analysis. Major findings showed that rapid urbanisation has led to an increase in all urban environmental problems. The paper will make a valuable contribution to the understanding of the environmental challenges associated with urbanisation of Abuja and help identify potential solutions. The paper concludes that Abuja's environmental issues are a direct result of rapid urbanisation and lack of adequate planning as well as infrastructure deficits. The paper recommends that proper city planning and management are necessary to ensure the long-term sustainability of urban environments. This paper provides valuable insights for other cities facing similar challenges as well as a useful case study for future investigations.

Key Words: *Urbanisation, Environmental challenges, Informal Settlements, Abuja, Nigeria*

Introduction

The population of Abuja, Nigeria increased remarkably in the 1990's when the country's capital was relocated from Lagos. City growth through urbanisation has a profound impact on the major components of the environment – air, water and land. These components are adversely affected by activities of growing urban human population in their quest at exploiting the already limited resources. The growth of cities places a lot of demand on the environment which are threatening future environmental

sustainability (Riffat *et al*., 2016). Yet, urbanisation has driven and still driving urban population relentlessly to the point of threatening the urban environment. These threats have resulted into environmental issues such as air and water pollution, waste management, environmental degradation, flooding, oil spillage, climate change and global warming among others (Pona *et al*., 2021). Associated with these are many challenges which include housing deficits, shortages in gainful employment, distortion in the environmental balance, urban crime and many more (Daramola and Ibem, 2010).

It is posited that majority of the world's population reside in the cities (Awumbila, 2017) and by projection, the United Nations Development Programme Millennium Development Goal (UNDP MDG Report, 2014) report postulated that this trend will continue in the years to come (UNDP MDG Report, 2014). By a United Nations Department of Economic and Social Affairs (UN DESA, 2018) report, more than half (around 55% or 4.2 billion people) of the world's population live in the cities and this is projected to grow to about 68% (6.5 billion people) by the year 2050 (UN DESA, 2018). In 2021, a new projection has it that about two-thirds of the world's population will live in the urban areas by 2030 and about 75 per cent by 2050 (Saley, 2021), (UNDP MDG Report, 2014). World cities are rapidly growing as a result of increase due to urbanisation and natural birth (Farrell, 2018), (Mardeusz, 2014). Studies have established that future increases in the world urban population are expected to be concentrated in few countries of Asia and Africa notably China, India and Nigeria, and the trio will jointly account for about 35% of the projected growth (UN DESA, 2018), (Awumbila, 2017). The Report further stated that by 2050, China, India and Nigeria would have added 255 million, 416 million and 189 million people respectively to the world's urban population (UN DESA, 2018). Urban population in informal settlements in Abuja are confronted with several environmental challenges thus impacting not only on the residents' well-being but also urban quality of life.

Literature Review

Urbanisation

The quest for socio-economic opportunities have continued to drive African rural dwellers to the cities. This rural-urban migration phenomenon (urbanisation) has led to an increase in the urban population with variety of urban environmental challenges among others (Basile and Ehlenz, 2020). Urbanisation is a process that leads to increase in the city population as a result of migration of people from rural areas to urban areas and the subsequent deviations to the urban sceneries (Kuddus *et al*., 2020), (Moore, 2019). Globally, and particularly in Africa south of the Sahara, urban population continued to experience rapid and continuous growth as people move from rural to urban settings in search of better living (Durosaiye and Hadjri, 2022). The combined effects of these challenges call for the need for responses from all stakeholders in urban planning and management.

Due to growing population, poor economy, infrastructure services and amenities deficiency especially in the rural and peri-urban areas, cities are growing rapidly particularly in the Global South (Basile and Ehlenz, 2020). This scenario leads to the development of un-

regulated and informally-built homes. Informally-built homes and the dwellers throw up series of environmental challenges to the urban managers. Provision of adequate and affordable housing is a major challenge in Nigeria especially among the urban poor (Izobo-Martins *et al*., 2018), like any country south of the Sahara. This situation has resulted into the development of unregulated self-help informal settlements with many environmental challenges (Gil and Celhay, 2022). Such challenges include environmental pollution of all sorts, overcrowding, traffic congestion, various health issues and many more. Environmental challenges are rising progressively as a result of pressure on the environment occasioned by population explosion.

In the case of Abuja, Nigeria's Federal Capital Territory (FCT), despite the availability of a Master Plan and development timeline, the eventual movement was spontaneous and did not align with the plan, thereby leading to the city's population explosion. With the resultant population influx, pressure increased on available urban resources and infrastructures and amenities in the city centre (Ben and Okon, 2020).

Scope of the Study

The scope of the work covers five informal settlements of Abuja. Abuja is one of the six Area Councils of the Federal Capital Territory (FCT), administratively known as Abuja Municipal Area Council (AMAC) covering a land area of 1,769 square kilometers. The area is bounded by Bwari Area Council to the North East, Gwagwalada to the West, Kuje to the South and Nasarawa State to the East. Within this area, the work will be limited to a purposively selected five informal settlements spread across the study area. These are: Tundunwada (Lugbe), Kuchingworo, Jabi Village, Garki Village and Gishiri Village. The case studies are selected by the prevailing developmental pattern.

The urban problems (housing deficits, development of slums, traffic congestion, high crime rates, environmental issues, land shortages leading to disputes and many more) experienced in Lagos led to the emergence of the FCT, Abuja, Nigeria. It lies in the North Central part of Nigeria and bordered by Niger State to the West and North West, Kaduna State to the North East, Nassarawa State to the East and South and Kogi State to the South West having an area of approximately 7,315 square kilometers. Abuja has an altitude of 360 meters above sea level and has a cooler climate and less humidity compared to Lagos, the former capital of Nigeria.

Study Area

Location

Geographically, Abuja is centrally located at the centre of the country and lies within the North Central region of Nigeria having been carved out of the states bordering the region namely Kogi, Niger, Kaduna and Nasarawa States with a large mass of the land carved out of Niger State. The FCT is located North of the confluence of Rivers Niger and Benue and lies between Latitude 8.25^{o}N and 9.20^{o}N of the Equator and between Longitude 6.45^{o}E and 7.39^{o}E of Greenwich Meridian. Abuja is situated within the savannah region with moderate climatic conditions.

Political and Demographic Characteristics

Abuja features a 400-meter monolith rock called Aso Rock where the

Presidential Complex, National Assembly Complex and Supreme Court (collectively referred to as "The Three Arms Zone) are located. For administrative purposes, the FCT has six Area Councils with the Abuja Metropolitan Area Council (AMAC) serving as the FCT's Administrative headquarters. Abuja is approximately 480 kilometers North East of Lagos and has an estimated population of 3,564,100 inhabitants (2016 estimation) with a density of 190 persons per square kilometer (Ogbuenyi, 2022). According to the United Nations, between 2000 and 2010, Abuja grew by 139.7 per cent making it the fastest growing city in the world. The rapid urbanisation of the territory leads to various urban challenges being experienced today.

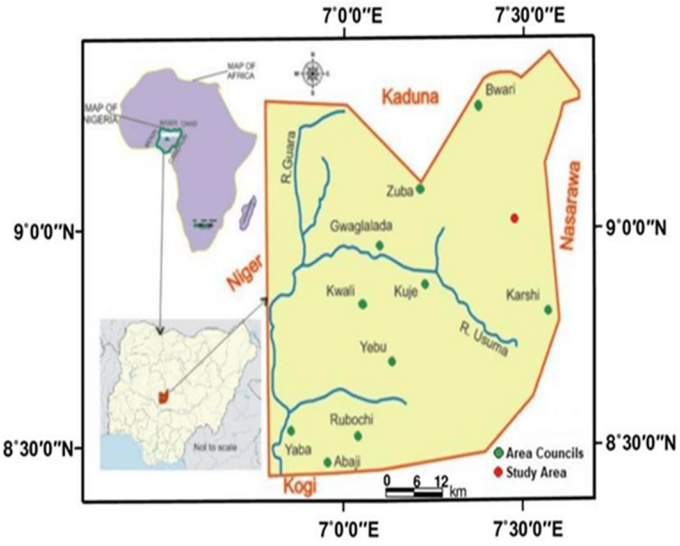


Fig. 1: FCT in relation to Nigeria and Africa
Source: map.svg/

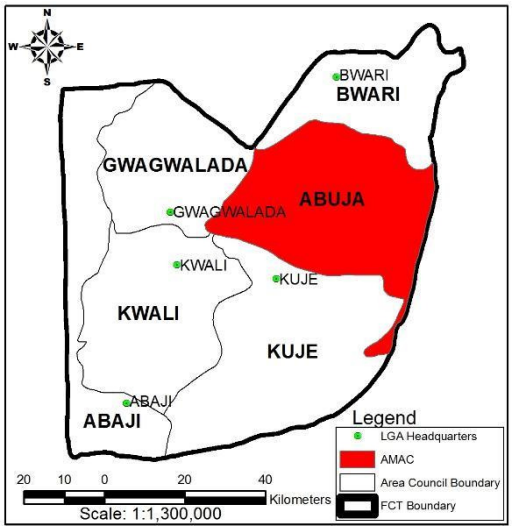


Fig. 2: The FCT showing the six Areas Councils
Source: map.svg/

Research Design and Methods

The work uses a cross sectional explanatory research design. Multiple case studies were employed to carry out the survey of the study areas. Data were collected through primary and secondary means. Adopting multiple case studies permits comparison of the differences and similarities in the environmental challenges facing the selected settlements. A mixed method research approach was deployed. Quantitative and qualitative data collection methods used include household survey, interviews, questionnaire and direct observation. Questionnaires were administered randomly to selected respondents in the selected study areas. The questionnaires were coded for ease of scientific analysis of data using Statistical Package for the Social Sciences (SPSS). Quantitative data were subjected to descriptive analysis while qualitative data were subjected to content analysis.

Sampling techniques and procedures

Purposive sampling technique was used to select five informal settlements across the study area. This sampling method was informed by the authors' knowledge of the various informal settlements clustered in the study area. The adoption of the technique was also

based on the understanding that the selected samples will be a good representative of the informal settlements in the study area. The respondents, usually the heads of the households, were also purposively selected. This was informed by their ability to expertly clarify issues on the subject of investigation. Random sampling technique through systematic mode was used to select a representative of housing population for the study with a confidence interval of 5% and confidence level of 95%. This is a procedure where the first house to be sampled was chosen using simple random technique. Subsequent units of investigation were selected at equal interval of every fifth house, on each side of the street. This method affords good representative of housing units as well as permit generalizations to the population in each of the selected case study areas. Systematic random sampling was adopted where the first house to be sampled was chosen using simple random technique. Subsequent units of investigation were selected at equal interval of every fifth house, on every side of the street. A household head is taken to be an adult of at least 18 years in every selected building. This is based on the understanding that respondents in this age category of headship have better understanding on the subject matter under investigation. This sampling method was considered appropriate and adopted because there were scanty and incoherent information on house numberings. Many of the buildings are not numbered at all. From this sampling procedure, a total of 340 questionnaires were administered to stakeholders in five selected informal settlements of the study area. These are: Tudunwada, Kuchingoro, Jabi, Garki and Gishiri.

Units of Investigation and Return Rate

The units of investigation (residents' houses) were purposively selected. A total of 295 questionnaires were recovered from the stakeholders at the end of the survey; thus, giving a questionnaire recovery rate (QRR) of 86.8%. In administering the questionnaires, four trained but supervised research assistants were involved. A breakdown of the recovered questionnaires in each of the sampled settlements of Tudunwada, Kuchingoro, Jabi, Garki and Gishiri were 131, 38, 33, 48 and 45 respondents respectively (Table 2).

As shown in Table 1, a total of 340 questionnaires were administered in the study areas, Tudunwada (160 questionnaires); Kuchingoro (40 questionnaires); Jabi (40 questionnaires); Garki (50 questionnaires) and Gishiri (50 questionnaires). In all, a total of 295 good and complete questionnaires were retrieved representing approximately 87% questionnaire return rate (QRR) in the five case study areas. With the aid of simple random technique, respondents were selected from the 13 Community Development Associations (CDAs) across the selected five case study areas. Inappropriately completed questionnaires are considered as "missing response" in the analysis.

Table 1: Sample Size

S/N	Settlements	Code	Nos of CDAs	Total Housing Population	Sample Size
1	**Tudunwada**	TW	4	800	160
2	**Kuchingworo**	KG	3	200	40
3	**Jabi**	JB	2	200	40
4	**Garki Village**	GK	2	250	50
5	**Gishiri Village**	GH	2	250	50
				1,700	340

Table 2: Research Instrument Return Analysis

S/N	Settlements	Sample Size	Number of Returned Instruments	% of Returned Instruments
	Tundunwada	160	131	81.88
	Kuchingworo	40	38	95
	Gishiri Village	50	45	90
	Jabi Village	40	33	82.5
	Garki Village	50	48	96
		340	**295**	**86.8**

Data Analysis

Data processing and analysis for this study were carried out using the Statistical Package for Social Sciences (SPSS) 20 for windows. Content Analysis, a non-statistical tool, was used in processing data from interviews and observations. Statistical Package for Social Sciences (SPSS) was equally employed for the statistical analysis of the quantitative data in this study. Environmental variables considered include poor waste management, poor health services, pollution, traffic congestion, flooding and deforestation. Other unclassified ones are termed others.

Result and Discussion

This section contains the analysis and interpretation of data obtained from a survey conducted to investigate the environmental challenges of population explosion in Abuja, Nigeria. The study put to use primary data obtained through questionnaire administered on respondents in the selected study areas. In addition, several scholarly literatures and other materials were extensively reviewed, the knowledge of which form the basis for developing the questionnaire for the collection of data. Descriptive statistics were used in analyzing the data obtained. This involved the calculation of frequencies and percentages and the presentation of the results using tables and charts.

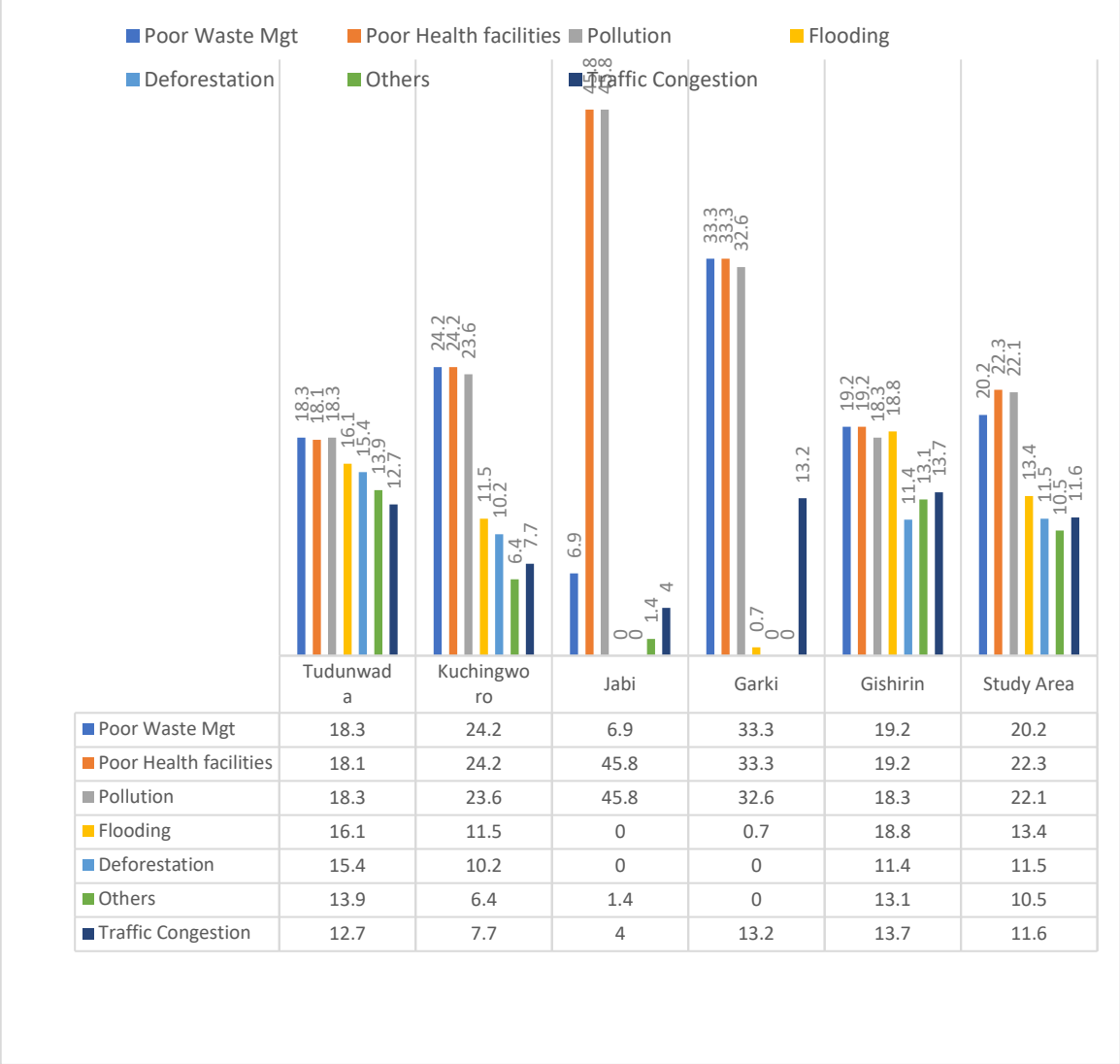
The results of environmental challenges revealed that a high proportion (22.3%) of the respondents attested to poor state of health facilities in the study (Table 3, Figure 1). This proportion accounted for 22.3% of all responses on environmental challenges encountered by the respondents in the study areas. Other environmental challenges encountered by the residents include pollution (22.1%), poor waste management (20.2%), flooding (13.4%), traffic congestion

(11.6%) and deforestation (11.5%). Furthermore, across the sampled settlements, environmental challenges with topmost concern revealed that, in Tudunwada settlement residents affirmed to the state of poor waste management (18.3%) and pollution (18.3%). In the case of Kuchingworo and Gishiri settlements, poor health facilities and waste management was identified by the residents. Although, a similar trend was observed in Garki settlement, the residents indicated no experience of deforestation. The prevalent environmental challenges as indicated by residents in Jabi settlement was poor health facilities (45.8%) and pollution (45.8%). Based on these findings, it was established that the entire study areas were characterized by existing environmental challenges and differed across the sampled settlements.

Table 3: Residents' Environmental Challenges in the study area

	SETTLEMENT					**Overall Area**
	Tudunwada	**Kuchingworo**	**Jabi**	**Garki**	**Gishiri**	
Environmental challenges	*Freq. (%)*	*Freq. (%)*	*Freq. (%)*	*Freq. (%)*	*Freq. (%)*	*Freq. (%)*
Poor waste management	126 (18.3)	38 (24.2)	5 (6.9)	48 (33.3)	44 (19.2)	261 (20.2)
Poor health facilities	125 (18.1)	38 (24.2)	33 (45.8)	48 (33.3)	44 (19.2)	288 (22.3)
Pollution	126 (18.3)	37 (23.6)	33 (45.8)	47 (32.6)	42 (18.3)	285 (22.1)
Flooding	111 (16.1)	18 (11.5)	-	1 (0.7)	43 (18.8)	173 (13.4)
Traffic congestion	121 (12.7)	18 (7.7)	7 (4.0)	44 (13.2)	40 (13.7)	230 (11.6)
Others	96 (13.9)	10 (6.4)	1 (1.4)	-	30 (13.1)	137 (10.5)
Deforestation	106 (15.4)	16 (10.2)	-	-	26 (11.4)	148 (11.5)
***Total**	**690 (100)**	**157 (100)**	**72 (100)**	**144 (100)**	**229 (100.0)**	**1292 (100)**

***Note:** The total number of responses exceeded the number of residents in the survey due to multiple response to the question*



	Tudunwada	Kuchingworo	Jabi	Garki	Gishirin	Study Area
Poor Waste Mgt	18.3	24.2	6.9	33.3	19.2	20.2
Poor Health facilities	18.1	24.2	45.8	33.3	19.2	22.3
Pollution	18.3	23.6	45.8	32.6	18.3	22.1
Flooding	16.1	11.5	0	0.7	18.8	13.4
Deforestation	15.4	10.2	0	0	11.4	11.5
Others	13.9	6.4	1.4	0	13.1	10.5
Traffic Congestion	12.7	7.7	4	13.2	13.7	11.6

Fig. 3: Analysis of Residents' environmental challenges (all figures are in %)

Conclusion

For the study, six variables were considered in investigating the environmental challenges encountered by the respondents. These are: Poor waste management, poor health facilities, pollution, flooding, traffic congestion and deforestation. Findings revealed that majority of the respondents are faced with poor state of health facilities at 22.3% as revealed by the computation for the overall study area. The greatest environmental challenges to the respondents in Tudunwada settlement were poor waste management (18.3%) and environmental pollution (18.3%) as well. In Kuchingworo settlement, poor waste management, poor health facilities and environmental pollution were the greatest environmental challenges at 24.2%, 24.2% and 23.6% respectively.

In Jabi settlement, poor health facilities and environmental pollution at 45.8% and 45.8% respectively were the greatest

environmental challenges. The only health facility open to the settlement is extremely far and could not be accessed in times of emergency. Poor waste management, poor health facilities and environmental pollution at 33.3%, 33.3% and 32.6% in that order were the greatest challenges of Garki settlement as attested to by the respondents. In Gishiri settlement, poor waste management (19.2%), poor health facilities (19.2%), flooding (18.8%) and environmental pollution (18.3%) were the greatest environmental challenges confronting the respondents. Overall, the least experienced environmental challenges by the respondents were flooding and deforestation at 13.4% and 11.5% respectively.

Poor state of health facilities, pollution and poor waste management are the topmost environmental challenges encountered by the respondents. Generally, the study established that the entire study areas were characterised by existing environmental challenges and differ from settlement to settlement. Rapid urbanisation and lack of adequate urban planning and infrastructure deficits are identified as major drivers of environmental challenges in the city. The paper recommends that proper urban planning and management are necessary to ensure the long-term sustainability of urban environments. The paper further suggests the removal of bias syndrome where developmental projects favour the already developed urban areas in apparent disregard for the peri-urban.

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